

- Lucapinella limatula* Reeve. Uncommon, Chenkan.  
*Fissuridea alternata* Say. Progreso, Chenkan, near Sabancuy.  
*Fissuridea alternata* Say var. *dysoni* Reeve. Chenkan, Sabancuy.  
*Submarginula octoradiata* (Gmelin) Adams. Scarce, Campeche, San Lorenzo.

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UNIONIDAE FROM THE REELFOOT LAKE REGION IN WEST TENNESSEE

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BY DR. A. E. ORTMANN

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The following report is founded primarily upon the collections made by the writer during the "Geo. H. Clapp Expedition to Reelfoot Lake" of the Carnegie Museum in August, 1924. It includes localities in Reelfoot Lake proper;<sup>1</sup> further

<sup>1</sup> Blue Basin, Lake Co. (N. W. shore); Bluebank, Lake Co. (South end); and Samburg, Obion Co. (East shore).

in the Bayou de Chien, Walnut Log, Obion Co. (tributary entering the lake near its northern end; and North Fork Obion River, Union City, Obion Co. (a tributary of the Mississippi receiving the waters of Reelfoot Lake).

This material was supplemented by specimens collected in July, 1925, in the lake (near Samburg) by Mr. Steven B. Crossley, who acted as guide during the expedition of 1924. The latter specimens arrived in part alive.

From this region we possess only one previous list of mussels, collected by S. N. Rhoads in 1895, and published by H. A. Pilsbry and S. N. Rhoads (P. & R.) (Proc. Acad. Philadelphia 48, 1896, pp. 500-506). The Reelfoot Lake shells of this list are from Samburg, Obion Co.; but there are a few also from Wolf River, Raleigh, Shelby Co. (near Memphis), a locality probably with ecological conditions similar to those of Obion River. Most of the species of this list have been found by myself, and several have been added. The following enumeration includes all forms known from these western parts of Tennessee (Mississippi Embayment and Mississippi Bottoms).

1. *Fusconaia flava* (Rafinesque).—Union City, one gravid female, with the diameter of 47% of the length. This is a typical representation of the species (See Ortmann, Proc. Americ. Philos. Soc. 59, 1920, p. 282), and has also a reddish-brown epidermis and reddish nacre.

A species belonging generally to small streams, found preëminently in the Ohio drainage (and that of the Great Lakes). Present in small streams tributary to the Cumberland; entirely absent in the Tennessee drainage.

2. *Fusconaia flava trigona* (Lea).—Union City, one male and one female, with the dia. of 58 and 57%. Thus these specimens are distinctly more swollen than the specimen of *flava*, and fall under the var. *trigona*, as defined by me. Since their obesity is not very great, and since the beaks are not remarkably elevated, they could not be called var. *undata* (Barnes).

This form represents *F. flava* farther downstream in the Ohio system. It is also represented west of the Mississippi, but these forms require further study.

3. *Megaloniais gigantea* (Barnes).—Union City, abundant.

A species of the larger rivers of the Interior Basin.

4. *Plectomerus trapezoides* (Lea).—Union City, one female. Reported by P. & R. from Samburg.

A southern species, which seems to have its metropolis in the tributaries of the Mississippi in the Mississippi Embayment.

5. *Amblema costata* Rafinesque.—Union City, not rare. The specimens at hand have the diam. of 44 and 45%, which thus is below the maximum obesity (47%) given for this form by Ball (Ecology 3, 1922, p. 134). As I have pointed out (Amer. Midland Natural. 9, 1925, p. 333), this should better be changed to a higher figure.

Widely distributed in the Interior Basin, preferring the smaller streams.

6. *Amblema peruviana* (Lamarck).—Not found by myself, but reported by P. & R. (as *U. plicatus* Lea.) from Samburg.

This is a form of very large rivers and quiet water, possibly passing into the *A. costata* of the smaller rivers. Its presence in Reelfoot Lake should be expected.

7. *Quadrula pustulosa mortoni* (Conrad).—Union City, abund-

ant. Reported from Wolf River, Raleigh, Shelby Co., by P. & R. (as *U. turgidus* Lea).

This form differs from typical *pustulosa* of the Ohio, Cumberland and Tennessee drainages in the subquadrate outline, the well developed posterior ridge, and—in its typical phase, as found, for instance, in Louisiana—in the color of the epidermis, which is ashy-greenish-brown, without the broad green ray of *pustulosa* (in which the epidermis is more or less tawny). Yet no sharp line can be drawn between the two forms. From northern Arkansas (White River and St. Francis River) I have intergrades, chiefly in the color of the epidermis, which frequently show the broad green ray of *pustulosa*, and also approach it in shape (more rounded, with indistinct posterior ridge). The specimens from Obion River are much like those from northern Arkansas: their shape is that of *mortoni*, but the color is more tawny and has, at least in younger specimens, the broad ray.

This seems to be a southern representative of *Qu. pustulosa* in the Mississippi Embayment. It is very variable, and not yet fully understood. *U. nodiferus* Conr. (Jackson, La.) apparently is an absolute synonym. *Qu. spherica* (Lea) and *refulgens* (Lea) seem to be local phases of this, belonging to the Amite, Pearl and Chickasawhay (Pascagoula) drainages in Louisiana and Mississippi.

*Quadrula pustulosa* (Lea) has been reported by P. & R. from Samburg. I have not seen specimens from Reelfoot Lake, and do not think that the true *pustulosa* is found in the lake; probably it is *mortoni*.

8. *Quadrula quadrula* (Rafinesque) var.—Bluebank, Lake Co. I have seen dead shells at Samburg, and S. B. Crossley has sent four splendid specimens (alive, males) from the lake. P. & R. report this, as *U. asperrimus* Lea, from Samburg.

The dia. of the six specimens at hand is between 55 and 60%, and thus they are considerably more obese than normal *quadrula* (Dia. under 52%, see: Ortmann, Amer. Midl. Natural. 9, 1925, p. 331). In height they agree fairly well with the latter (77 to 86%), and also in the moderate development of the tubercles, as well as in color (brownish, with greenish tints,

when younger). They are by no means the southern *Qu. aspera* (Lea), as might be suspected from the locality, for the latter has smaller, more numerous and more crowded tubercles, and is generally less swollen. *Qu. quadrula fragosa*, which is rather swollen, has stronger tubercles, and is more elevated.

My specimens resemble the form *cantraryensis* Utterback (Lake Contrary, St. Joseph, Mo., see: Amer. Midl. Natural. 4, 1916), but the latter has much weaker sculpture. I should call attention to the fact that the figure of the smaller specimen of *U. nobilis* Conrad (Journ. Acad. Philad. 2, 1854, pl. 27, f. 2) closely resembles my two younger specimens. This figure has been declared by Simpson (1914, p. 323) to represent *U. apiculatus* Say, but I believe that the two figures given by Conrad (figs. 2 and 3) might very well belong to the same form, fig. 3 probably representing an old, somewhat deformed specimen (possibly a female?). The forms grouping around *Qu. quadrula* (*quadrula*, *fragosa*, *aspera*, *nobilis*, and also *apiculata*) and their interrelations require revision.

*Qu. quadrula* is abundant in larger rivers of the Interior Basin, passing southward into *aspera*. It seems to develop several local or ecological modifications.

9. *Quadrula verrucosa* (Rafinesque).—Union City, abundant. Reported by P. & R. from Wolf R., Raleigh, Shelby Co.

A species of immense distribution in nearly all of the Mississippi drainage, and also in streams running to the Gulf, from Alabama to Texas. I found several specimens with purplish nacre, a color seen chiefly in the southern part of the range.

10. *Arcidens confragosus* (Say).—Union City, two males. Reported from the lake at Samburg by P. & R.

A species centering in its distribution in the Mississippi Embayment, and thence advancing into the lower, sluggish parts of the larger rivers, frequently found in ponds and lakes.

11. *Lasmigona complanata* (Barnes).—Union City, one male.

The center of the area occupied by this species lies in the middle of the Interior Basin, in the quieter waters of the largest rivers, and also in ponds, lakes and canals. Under favorable conditions, the range extends well towards the headwaters, chiefly in a northerly direction, where it has crossed over into

the St. Lawrence drainage, and is said to extend even into the Mackenzie Basin. It also goes down the Mississippi Embayment to the Gulf Coastal Plain in the Alabama drainage.

12. *Anodonta imbecillis* Say.—Bayou de Chien, Walnut Log, not rare. Two specimens from the lake have been sent by S. B. Crossley. Reported from the lake at Samburg by P. & R.

Of tremendous distribution from Texas to the Great Lakes region, and over the Gulf Coastal Plain to the southern parts of the Atlantic Coastal Plain. Chiefly in quiet waters.

13. *Anodonta grandis gigantea* (Lea).—Lake at Bluebank and Samburg; Bayou de Chien at Walnut Log. Reported from Samburg by P. & R. (as *grandis* Say). S. B. Crossley has sent about twenty immature specimens.

The specimens collected correspond most closely to the var. *gigantea*, which is merely an ecological form, belonging to ponds and lakes with muddy bottom. It is close to, possibly identical with, *A. corpulenta* Cooper, and *A. stewartiana* Lea (chiefly the young ones to the latter).

The range of *A. grandis* is enormous, corresponding largely to that of *A. imbecillis*, also preferring mostly quiet waters. It is extremely variable, and has developed a great number of local and ecological races, which are not yet fully understood.

14. *Anodonta suborbiculata* Say.—I found only one young specimen in the Blue Basin of the lake, but S. B. Crossley has sent several larger ones. Reported from Samburg (P. & R.).

Apparently a typical lake-form, centering in the middle of the Interior Basin, where the three large rivers unite, and extending down the Mississippi Embayment to Louisiana.

15. *Truncilla truncata* (Rafinesque).—Not found by myself, but reported by P. & R. from Samburg (as *U. elegans* Lea).

Widely distributed over the Gulf Plain, through the Mississippi Embayment and the Interior and Great Lakes Basins, found under very diverse conditions, in swiftly running water as well as in ponds and lakes. It is to be expected in Reelfoot Lake.

16. *Leptodea fragilis* (Rafinesque).—Union City, one female. Also in Wolf R., Raleigh, Shelby Co. (P. & R., as *U. gracilis* Barnes).

On the Gulf plain from Alabama to Texas, up the Mississippi Embayment into the Interior Basin and that of the Great Lakes. Also this species is found in both running water and in lakes.

17. *Proptera purpurata* (Lamarck).—Not found by myself, but reported from Wolf R., Raleigh, Shelby Co. (P. & R.).

Represents the *P. alata* (Say) of the Interior Basin in the South, on the Coastal Plain from Alabama to eastern Texas. In the northern parts of the Mississippi Embayment (in Missouri), it seems to pass into *P. alata*. It is common in the state of Mississippi, just south of the locality in western Tennessee.

18. *Carunculina parva* (Barnes).—Lake at Bluebank, one gravid female. Reported from Samburg (P. & R.).

My specimen is typical, and sharply distinct from those of the next species.

Most abundant in the central parts of the Interior Basin, crossing over to the Great Lakes. Known also from southern localities as far as Texas. There are related forms in Alabama, Georgia and northern Florida, which may be simply local races of this. The species prefers quiet waters.

19. *Carunculina texasensis* (Lea).—Lake at Bluebank and Samburg, not rare. Reported from Samburg by P. & R.

Generally supposed to represent *C. parva* in the South, from Texas and Alabama up to the Mississippi Embayment to southern Illinois and Indiana. It may intergrade with *C. parva*, but in Reelfoot Lake the two are perfectly distinct. A species of quiet waters.

20. *Micromya lienosa* (Conrad).—Union City, two males.

Distribution very similar to that of *Car. texasensis*, chiefly in its northward extension. In Alabama, however, it goes considerably more eastward (to Georgia and S. Carolina), although in a somewhat different form (*concestator* Lea). Also in its main range it varies a good deal; my specimens agree very well with others from Mississippi and Arkansas; they are of good size, have the epidermis blackish, and the nacre whitish or with purplish tint.

21. *Ligumia subrostrata* (Say).—Lake at Bluebank and Sam-

burg, not rare, a number sent by S. B. Crossley. Reported from Samburg by P. & R.

From the Coastal Plain (Texas to Alabama) up the Mississippi Embayment into the central parts of the Interior Basin, restricted to quiet water of large rivers, ponds and lakes.

22. *Lampsilis anodontoides fallaciosa* (Smith).—Union City, very abundant. Probably the record for Wolf R., Raleigh, Shelby Co., given by P. & R. (as *U. anodontoides* Lea) refers also to this variety.

All my specimens represent the typical *fallaciosa*. At the time, when Pilsbry and Rhoads published their list, this had not been separated from the main species. The latter and the variety are almost co-extensive in their range, which covers the central parts of the Interior Basin, the Mississippi Embayment and the Coastal Plain from Texas to Florida. However, in the latter region, the form *fallaciosa* seems to be absent, while other local forms turn up. Elsewhere, *fallaciosa* seems to be the form of quiet water and sandy-muddy bottom, while *anodontoides* is found in stronger current and gravel. Thus my specimens are from the sandy-muddy bottom of Obion River, with slowly, but steadily flowing water.

23. *Lampsilis ovata satura* (Lea).—Union City, one male.

This form, which is not a direct descendant of *L. ovata*, but rather of *L. ovata ventricosa* of the Interior Basin, seems to be characteristic of the Mississippi Embayment, south to Louisiana and eastern Texas, and intergrades in northern Arkansas with *ventricosa*. On the other hand, in the state of Mississippi, it gradually changes into *L. excavata* (Lea), typical for the Alabama River drainage. The present locality is the most northern record for *satura* east of the Mississippi.

If we add to the above list the record of *Strophitus rugosus* (Swainson) from "Horn Lake Creek, Shelby Co., Tenn.", given by Lea<sup>1</sup> (as *Anodonta shæfferiana*), we have here a complete list of all Naiades ever reported from the direct drainage of the Mississippi River in western Tennessee. The contrast

<sup>1</sup>There is a station "Horn Lake" on the Ill. Centr. R. R. just across the state line, south of Memphis, in De Soto Co., Miss.

with the fauna of other parts of the state of Tennessee is remarkable. The number of forms is surprisingly small, and yet there is a high percentage of shells, which are peculiar to the Mississippi Embayment. This fact should be kept in mind, for it is important in the study of the development of the Naiad faunas of North America.

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THE ACANTHODORIDIDAE OF THE CALIFORNIA COAST

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BY F. M. MAC FARLAND

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(Concluded from page 65)

ACANTHODORIS COLUMBINA sp. nov. Plate II, Figures 5, 9, 10, 11; Plate III, Figures 1, 2, 5.

Six individuals of this form were collected at low tide in reef pools at Moss Beach, near Montara Point, San Mateo County, California, on July 26, 1922. A second collecting trip to the same locality on May 3, 1923, failed in securing any more of this interesting new species.

The animal has the plump, nearly oval outline characteristic of the Acanthodorids. The foot is completely covered by the wide, thick border of the mantle, save for the tip of the tail. The dorsum is covered everywhere with closely-set, slender, tapering papillae, reaching 1.5 to 2.0 mm. in length, and giving it a soft, velvety appearance. This is rather deceptive, however, for the body is firm to the touch, the mantle being everywhere filled with slightly curved calcareous spicules (Pl. III, fig. 2) interlacing in various directions. Each papilla is reinforced by a group of spicules, mainly lengthwise in arrangement, and nearly filling it. These extend well down into the dorsum, and are strengthened by others added at lower levels, so that each papilla contains a firm, skeletal framework, precluding anything more than slight movement of its apical half. The margins of the rhinophore openings are similarly reinforced.

The ground color of the dorsum is a dusky, brownish mauve. The papillae are tipped with lemon yellow, and each one is more or less deeply shaded with brown, and none of them are